

OUTSIDE IN

COST-EFFECTIVELY IMPROVING INDOOR CELL COVERAGE

It is hard to imagine today but advanced mobile devices have not always been commonplace. Today, smartphones and tablets have supplanted not only the original cellular handsets but home and office landlines as well. People of all ages and in all professions rely on their mobile devices for business and personal applications. Take a smartphone away from a millennial and they will be unable to function!

WHY DO EMPLOYEES NEED CELLULAR COVERAGE INSIDE A BUILDING?

As more people use mobile devices in all aspects of their lives, use inside buildings has increased significantly. Studies have shown that 70 percent or more of mobile data use takes place indoors.

This includes offices, industrial areas, hospitals, schools, hotels and conferences centers, as well as in consumers' own homes.

Employees are increasingly using mobile devices for personal needs while in their offices or places of work. Many people use 'nanny cams' or pet cams to monitor their home while they are at work – many corporate firewalls block video streams and so employees use LTE to connect back to their homes. People are also reluctant to use the company Wi-Fi network to access personal information such as bank accounts or medical information (many companies monitor their employees' Internet activity).



And of course, companies are increasingly encouraging employees to use their own mobile devices for work reasons – this is more convenient for the employee and may be less expensive for the employer. Hence, the so-called Bring Your Own Device (BYOD) trend is increasing where the employee chooses their own smartphone and/or tablet, pays for the service and then expenses the business use back to the employer.

BYOD has resulted in a greater mix of cellular service providers being represented in a typical office building. In the past, one or two of the major cellular operators would have a ‘corporate’ deal with a large company, meaning that all of the employees would use the same cellular provider. But with the BYOD trend, employees are free to select their own smartphone and service provider, hence a greater mix of service providers being used in a building. As we shall discuss later, this is an important point.

WHY DO CELLULAR SIGNALS NOT REACH INSIDE BUILDINGS?

Unfortunately, the RF signals that connect to our smartphones and tablets have problems penetrating most modern buildings. RF signals are blocked by most metals, reflected by energy efficient windows and are dispersed by water. A typical commercial office building uses steel in its construction, has steel rebar in the concrete walls and is more than likely to have heat-reflective windows. All of these factors mean that cellular signals will have a hard time penetrating the skin of the building and the employees will subsequently have poor, or no, cellular connectivity.

The problem gets worse for some cellular service providers. In general, lower frequency cellular signals penetrate objects better than higher frequencies. For example, the initial LTE networks were built using 700 MHz spectrum, which penetrates walls, glass and buildings in general far better than higher frequencies. But cellular service providers are now building networks using higher frequencies and more buildings are making use of environment construction. For example, buildings

CASE STUDY 1:

Metropolitan Market, an award winning grocery store chain based in Washington, was two months away from opening their newest branch when they discovered there was very poor cellular coverage inside the new building. The solution was to deploy WilsonPro Pro 70 Plus Select boosters with 14 indoor antennas. The result was four or five bars of LTE signal in all parts of the store on all major cellular networks. And everything was designed, installed and tuned prior to the grand opening!

that are LEEDs certified (Leadership in Energy and Environmental Design) are a big trend across the country (and are required in some cities) but these designs are very good at blocking cellular signals, as well as heat and cold. Interference from other wireless networks can also impact the in-building cellular experience.

Jeff Gudewicz, chief product officer at WilsonPro, notes that most people see poor in-building cellular coverage “as a carrier problem”. Typically, WilsonPro finds that employers will “not pay for a carrier-grade solution” and that the “problem is pushed down to the commercial building owner”.

Solutions to the in-building cellular coverage problem have been available for some time in the form of Distributed Antenna Systems or DAS. Essentially, these systems use a dedicated cellular base station connected to antennas inside the building to provide service. But the systems typically only work with one or two cellular service providers’ frequencies – in other words, to get service from all four of the major cellular carriers, up to four DAS would be required. This obviously adds to the cost and complexity involved with these systems.

THE SIGNAL BOOSTER SOLUTION

Another effective, and far more cost effective, solution is to use a signal booster to provide coverage inside a building, such as those provided by WilsonPro. A signal booster simply has an antenna on the outside of the building that receives the available cellular signals,

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We can bring outside cell signal inside.

Call us or visit our website to learn more about getting stronger cell signal in your business or office building.

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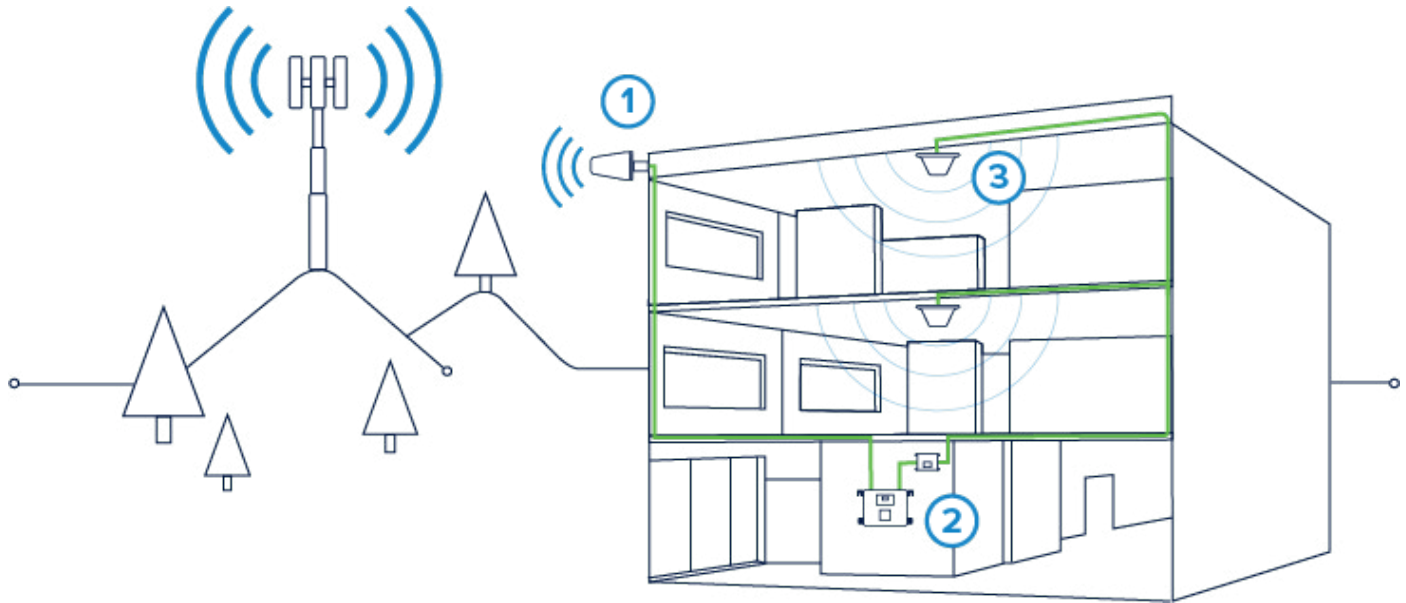


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amplifies them and then rebroadcasts throughout the building. Signal boosters are licensed by the FCC and are approved for use with all of the cellular service providers' networks.

Note that the signal booster does not have to receive a strong RF signal to be effective. On the contrary, the cellular signal outside can be very poor (such as in places far away from the cellular tower) and the signal booster will still be able to receive the signal, amplify it and provide coverage inside the building. The signal outside of the building therefore does not have to be strong in order for the signal booster to be effective.

CASE STUDY 2:

CHI St. Luke's Health Memorial Hospital in Lufkin, TX, which was originally constructed in the 1940s and expanded through the early 2000s. This meant that the hospital had areas of very poor cellular coverage, with doctors and nurses regularly complaining about the ability to get a cellular connection. A custom signal booster system was designed that provided coverage in the main problem areas and limited interference in critical care areas of the hospital. The result was happier healthcare staff, patients and visitors.

Signal boosters offer some very important benefits:

- **Carrier agnostic** – since the signal booster amplifies all of the available frequencies from all of the major operators, a single system can improve the coverage of all service providers inside the building. Hence, in companies that ask employees to BYOD, all of the service providers are represented and all employees can use their smartphones.
- **Equipment owned by the building owner/manager** – the signal booster acts independently of the cellular service provider (remember it is simply amplifying the available signal) and is licensed by the FCC. Hence the equipment is owned and controlled by the building owner or manager and not the cellular operator.
- **Highly customizable** – the signal booster can easily be configured to provide coverage in specific areas or zones of the building. For example, in a hospital, coverage is not required in an operating theatre or intensive care unit, but would be needed in the main ward, nurses' stations, restaurant, etc. In this case, the signal booster can be easily configured to provide coverage only in the required areas.

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HOW BUILDING MATERIALS AFFECT CELL PHONE SIGNAL PERFORMANCE



PHIL BLOOMBERG, Vice President of Commercial Sales, WilsonPro

Most of us own a cell phone With a wealth of mobile possibilities at our fingertips, it's hard not to expect strong cell reception all the time. Yet, we've all experienced the occasional dropped call or lost signal. While this can be frustrating, it's not always the cell carrier's fault. Often, there's just something between the cell tower and you.

OBSTRUCTIONS TO A GOOD SIGNAL

Cellular signals emanate from cell towers. Although there are countless towers in most developed areas of the country, there are several reasons that signals may not be reaching your device.

- **Distance:** If you're in a remote region with few cell towers, you may just be too far away for a strong signal to reach you.
- **Terrain:** Mountains, hills, and bluffs can all stand in the way of the tower and your device, absorbing the signals before they reach you.
- **Vehicles:** The metal and glass materials of a vehicle provide protection, but also can prevent cell signals from getting in.
- **Vegetation:** Thick forests, tall trees, and other vegetation can form natural barriers to signal waves.
- **Atmospheric conditions:** Turbulent storms, thick fog, and other weather conditions can easily disrupt cell signals.
- **Man-made obstructions:** Brick, concrete, and steel materials in bridges, buildings, and other man-made objects are notorious cell signal obstructers.

All these things can prevent cell signal from reaching your phone, resulting in poor reception. Man-made building materials are especially good at blocking out signals.

HOW BUILDING MATERIALS BLOCK SIGNALS

Almost any large object built by humans can interfere with cell phone connectivity. Since we spend a good deal of time inside, we depend on strong reception indoors. Yet, radio frequency (RF) signals cannot filter through materials like metal or concrete. Instead, large buildings or even the walls of your office can deflect or distort signal waves. That's why driving into a parking garage will almost always disrupt your cell reception—because suddenly the signal has to deal with numerous thick concrete walls.

Other building materials like wood, brick, stone, shingles, and drywall can have a similar effect, weakening and often blocking signals completely. Even glass—especially energy-efficient windows coated in metal-oxide—can cause signals to bounce right off the surface.

Generally speaking, reception will almost always be better outside a building than inside. So how can indoor cell reception be improved?

CELL SIGNAL BOOSTERS BRING THE OUTSIDE SIGNAL INSIDE

Cell signal boosters—also called bidirectional amplifiers—can make a big difference when it comes to bringing a cell signal from outside to indoors. These devices use antennas to take signal outside the building—even a weak one—and bring it indoors. Then, the booster amplifies the signal and broadcasts it inside, bringing a better signal within range of your phone. When you make a call, it works in the opposite direction by transmitting an amplified back outside to the cell tower.

Contact us to learn more about how a cell signal booster can improve your building's reception and create a custom design to meet your needs.

Phone: 1-888-503-5329

Website: www.wilsonpro.com

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- **Focus on areas of poor or no coverage** – many buildings have acceptable cellular coverage in parts of the building. For example, it is not unusual to find good coverage in the first ten floors and poor or no coverage in the higher floors, basement, inside rooms or parking garage. In these cases, the signal booster could be configured to provide coverage only in those areas of poor coverage – this makes for a very cost-effective solution.
- **Cost effective** – signal boosters cost a fraction of a DAS, are easy to install and can be reconfigured or expanded as needed.

THE IMPORTANCE OF INSTALLATION

While a signal booster is quite simple in concept, the execution within the building is very important. In order to be fully effective, the signal booster installation must be carefully designed and installed by trained, knowledgeable technicians. In the past, some signal boosters were installed incorrectly and therefore did not perform as expected.

To address this problem, WilsonPro has established a training program in Dallas, Texas to certify signal booster installers. The program is affectionally called 'Wilson University' or 'WilsonU'. The program takes two days to complete and covers all aspects of design, installation, test and trouble shooting. Since September 2017, WilsonPro estimates 120 installers

CASE STUDY 3:

Sports arenas present some of the most challenging RF environments – many are old buildings that block cellular signals and yet they are filled with fans who want to use their smartphones throughout the game. Such as example is Williams Arena ("the Barn"), home of the University of Minnesota men's basketball team, which was built in 1928. As a result of the old design and construction, there was no cellular signal in the team locker room and offices, located in the basement of the building. The solution was a WilsonPro signal booster and indoor antennas in the problem areas. Now, cellular signal is strong and the coaches and staff are finally able to make calls to team members and recruits.

have been certified by WilsonU. In total, WilsonPro has more than 500 certified installers across the U.S.

DO I NEED A SIGNAL BOOSTER?

This is a question that many commercial building owners and managers are asking. The answer is very simple: if your building has areas of poor or no cellular coverage, the answer is Yes! Signal boosters provide a very cost effective solution for providing cellular coverage throughout a building for all cellular service providers. Signal boosters can be configured to provide coverage as needed, are supported by a network of certified installers and are owned by the building owner/manager. ●



WilsonPro is a leader in wireless communications infrastructure, dedicated to delivering mobile phone access for everyone, everywhere. Each booster is designed to enhance signal from carrier networks, significantly improving coverage in commercial buildings. The boosters come equipped with patented technology to protect carrier networks. All WilsonPro products are designed, assembled and tested in the U.S.A. For more information, visit www.wilsonpro.com.